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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/070,908
Filing Date: July 12, 2002
Appellant(s): YONEYA ET AL.

Stefan U. Koschmieder
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 06/15/2007 appealing from the Office action mailed 03/15/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6091471	**KIM ET AL.**	**12-1996**
6682783*	**TOMIOKA ET AL.**	**5-1998**
6177972*	**HELD ET AL.**	**2-1999**
7123319*	**BROER ET AL.**	**8-2002**

MERRIAM WEBSTERS'S COLLEGIATE DICTIONARY, TENTH EDITION.

* These references were first presented in the Advisory Action mailed date 03/15/2007 in order to give the evidences of the in-plane switching mode liquid crystal display having electrode structures, which are similar to the structure of interdigitated electrodes of the instant invention and used to show electrode of the in-plane switching mode having identical structures with interdigitated electrodes of the instant invention.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 3-7 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al. (US6091471A).

In regard to claims 1, Kim et al. teach (Figs. 4, 10-14) a liquid crystal display device comprising

- a pair of substrates, at least one of which is inherently transparent for transmitting light through LC cell so that light can be modulated;
- a nematic liquid crystal between the pair of substrates as Figs. 10a-b shown.
- a In-Plane Switching (col. 6 line 32) mode liquid crystal cell as inherently a group of interdigitated electrodes
    - formed on at least one of substrates and
    - adapted to apply an electric field to the liquid crystal layer,wherein the electric field inherently having a component substantially parallel to the surfaces due to a In-Plane Switching (IPS) mode liquid crystal cell;
- an alignment layer
    - disposed between the liquid crystal layer and at least one of substrates;
    - having been subjected to liquid crystal anchoring treatments (col. 5 lines 53-55) in plural directions to form a plurality of liquid crystal in-plane anchoring directions as Fig. 14 with the photo energy more than 6000mJ/cm (Fig. 4, col. 5 lines 30-32), thereby forming a plurality of liquid crystal in-plane anchoring directions.

wherein

- two of liquid crystal in-plane anchoring directions of the alignment layer form substantially equal angles (as Figs. 14d-i shown) on the corresponding substrate surface;

- pretilt angle in one liquid crystal anchoring direction with respect to the corresponding substrate surface is substantially zero when the photo energy more than 6000mJ/cm (Fig. 4, col. 5 lines 30-32) or less than 5° that is in a range 0-5° (col. 1 line 35-36).

wherein

Claim 3:

- at least one of the liquid crystal anchoring treatments in the plural directions is a process for performing uniform anchoring treatment over an entire target area in each of the directions as shown (col. 2 lines 31-34).

Claim 4:

- at least one of the liquid crystal anchoring treatments in the plural directions is a process for dividing an entire target area into plural sub-areas corresponding to the plural directions and performing anchoring treatment in each of the sub-areas in the corresponding direction (col. 2 lines 14-20).

Claim 5:

- at least one of the liquid crystal anchoring treatments in the plural directions is a process for irradiating the alignment layer with linearly polarized light that can cause a chemical reaction on the surface of the corresponding substrate (col. 2 lines 21-27).

Claim 6:

- at least one of the liquid crystal anchoring treatments in the plural directions is a process for scanning the alignment layer with a probe that can impart stress to

the surface of the corresponding substrate (mechanical rubbing with friction on alignment layers as shown in Fig. 11a).

Claim 7:

- at least one of the liquid crystal anchoring treatments in the plural directions is a process for scanning the alignment layer as Figs. 3 and 14a-j shown with UV light that can cause inherently a chemical reaction on the surface of the corresponding substrate.

Claim 21:

- the device is capable of maintaining of two of stable in-plane alignment state crystal (two domains) even after the removal of the applied electric field as Figs. 10a-b and 14a-j shown.

(10) Response to Argument

Response of evidences in Clark, Patel and Jaegemalm:

A. Clark ("Sub-Microsecond Bistable Electro-Optic Switching in Liquid Crystals" Applied Phys. Letters 35(11), p899-901, 1 June 1980):

Applicants argue that Clark discloses the liquid crystal cell having an in-plane switching mode but does not disclose interdigitated electrode (page 4 lines 10-12).

However, examiner disagrees. Clark does not disclose the liquid crystal display with the in-plane-switching-mode electrode or interdigitated electrode, which must generate the electric field having a component of the electric field substantially **parallel** to the surfaces of the substrates. While Clark discloses in Fig. 1 that the voltage V(t) applied to electrodes to generate the electric field is substantially **perpendicular** (not parallel) to the surfaces of the substrates. However, this argument is moot as the claim was rejected as anticipated by Kim, not obvious over Clark.

B. Patel ("Flexoelectric Electro-Optics of a Cholesteric Liquid Crystal", Physical Review Letters 58, Number 15, pages 1538-1540, 13 April 1987):

Applicants argue that Patel discloses the liquid crystal cell having an in-plane switching mode but does not disclose interdigitated electrode (page 4 lines 16-18).

However, examiner disagrees. Patel does not disclose the liquid crystal display with the in-plane-switching-mode electrode or interdigitated electrode, which must generate the electric field having e a component of the electric field substantially **parallel** to the surfaces of the substrates. Patel discloses that "the inner surfaces of the cell are coated with transparent electrically conductive layers so that an electric field can be applied perpendicular to the plates and the helix

axis" (right column, second paragraph and lines 4-7). However, this argument is moot as the claim was rejected as anticipated by Kim, not obvious over Patel.

C. Jaegemalm "An electro-Optic Device Based on Field-Controlled Anchoring of a Nematic Liquid Crystal", Applied Physics Letters 73, number 12, pages 1616-1618, 21 September 1998):

Applicants argue that Jaegemalm discloses the liquid crystal cell having an in-plane switching mode without required interdigitated electrode (page 4 lines 13-14).

However examiner disagrees. Jaegemalm does not disclose the liquid crystal display with the in-plane-switching-mode electrode or interdigitated electrode, which must generate the electric field having a component of the electric field substantially **parallel** to the surfaces of the substrates. Jaegemalm disclose in Fig. 1 that electrical field E is perpendicular to glass substrate. However, this argument is moot as the claim was rejected as anticipated by Kim, not obvious over Jaegemalm.

To summary, all three provided references of Clark, Patel and Jaegemalm **do not explicitly** disclose the liquid crystal display with in-plane switching mode or interdigitated electrode, which must generate the electric field having a component

of the electric field substantially **parallel** to the surfaces of the substrates. All references gave the evidences of the electric field being **perpendicular** to the substrates; therefore, all references do not use interdigitated electrodes or in-plane-switching-mode electrodes.

Response to Tomioka, Held and Broer as evidence of an in plane switching electrodes having structure of interdigitated electrodes:

Applicants argues that Tomioka (U.S. 6,682,783), Held (U.S. 6,177,972) and Broer (U.S. 7,123,319) do not disclose all liquid crystal display device having in-plane switching mode necessarily have interdigitated electrodes (page 4 lines 21-22, page 5 lines 4-19).

However, examiner disagrees since

(1) the interdigitated electrodes and the in-plane-switching-mode electrode have identical structures (electrodes forming on one substrate) and

(2) the interdigitated electrodes and the in-plane-switching-mode electrode generate the similar electrical field (having component parallel to substrates).

Tomioka (U.S. 6,682,783) discloses a liquid crystal display device of in-plane switching mode using interdigitated electrodes (col. 1 lines 36-41) since interdigitated electrodes have same structure with electrodes using in the in-plane switching mode and interdigitated electrodes also generate the electric field with

component parallel to substrate like electrodes using in in-plane switching mode. As illustrating, the electrodes 1 & 4 (Fig. 4) of in-plane switching mode of Tomioka have same structure with interdigitated electrodes EL1A/EL1B or EL2A/EL2B shown in Figure 2 of the instant application.

Held (U.S. 6,177,972) discloses the IPS LCD cell is characterized by interdigitated electrodes 3, 4 which lie in substantially the same plane and are connected to a voltage source 5 via switch 9 (col. 3 lines 21-24). Held shows in Figure 3-4 that the electrodes 1 and 3 have the same structure of intergitated electrodes EL1A/EL1B or EL2A/EL2B shown in Figure 2 of the instant application.

Broer (U.S. 7,123,319) disclose the display laminate 300 has a single substrate 2 provided with a pair of interdigitated electrodes 8a and 8b for in-plane switching the liquid crystal layer 4 The substrate 2 is provided with an alignment layer 12 and confines a switchable liquid crystal layer 4 and the liquid crystal layer 4 is covered by a cover layer 6 (col. 16 lines 45-54). Broer shows in Figure 3-4 that the electrodes 8a and 8b have the same structure of intergitated electrodes EL1A/EL1B or EL2A/EL2B shown in Figure 2 of the instant application.

Furthermore, in Merriam Websters's College Dictionary 10th Edition, word "interdigitate" defines as "to become interlocked like the fingers of folded hands"; therefore, "interdigitated electrodes" may be understood as "electrodes interlocked

like the fingers of folded hands", which well illustrate structure of the in-plane switching electrodes in references of Tomioka, Held and Broer.

For summary, applicants fail to illustrate or to claim the differences between the interdigitated electrodes and "in-plane switching-mode electrodes". In fact, the interdigitated electrodes and the in-plane switching-mode electrodes have **the same structure** and generate **similar electric field**.

Response to a liquid crystal display device having a layer with a pre-tilt angle of substantially 0°.

Applicant argues that Kim does not disclose an alignment layer having pre-tilt angles of substantially 0° as evidenced by Kim's use of one-headed arrows to indicate the direction of alignment (page 6 lines 18-24 and page 7 lines 17-19. Applicants provided two references of Seo and Lien to illustrate the alignment with pre-tilt angle of substantially 0^0 (page 7 lines 23-25)

However, examiner disagrees since, in the final rejection (10/20/2006), examiner full considers the pre-tilt angle of substantially zero degree (page 4 lines 8-11 of final office action). Fig. 4 shows that when photo energy more than 6000mJ/cm, the pretilt angle is "less than 5 degrees" which is substantially zero degree or Kim disclose that the pretilt angle is almost zero degree when photo

energy at 6000mJ/cm which is substantially zero degree (col. 5 lines 30-32). Examiner does not repeat evidence, which was already fully considered in the Final Rejection.

Seo illustrates the alignment with polyimide of the different commerce grands (RN-626, SE-150, and RN-305) and under different rubbing strength as shown in Fig. 3-4. However, the invention did not use or claim the same grand of alignment.

Geary illustrates the buffing process for aligning or orienting the sematic and nematic liquid crystal materials. However, the all claims do not identify any process to align the liquid crystal.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,
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Oct. 4, 2007

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